



PATENT APPLICATION

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

In re application of

Docket No: Q62369

Seiji UMEMOTO, et al.

Appln. No.: 09/738,979

Group Art Unit: 2871

Confirmation No.: 2654

Examiner: Timothy L. RUDE

Filed: December 20, 2000

For: LIQUID-CRYSTAL DISPLAY DEVICE

SUBMISSION OF APPELLANT'S BRIEF ON APPEAL

MAIL STOP APPEAL BRIEF - PATENTS

Commissioner for Patents

P.O. Box 1450

Alexandria, VA 22313-1450

Sir:

Submitted herewith please find an original and two copies of Appellant's Brief on Appeal. A check for the statutory fee of \$330.00 is attached. The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account. A duplicate copy of this paper is attached.

Respectfully submitted,

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WASHINGTON OFFICE

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Date: January 20, 2004

Attorney Docket No.: Q62369



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APPELLANTS' BRIEF ON APPEAL UNDER 37 C.F.R. § 1.192

MAIL STOP APPEAL BRIEF - PATENTS

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P.O. Box 1450

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Sir:

This is an Appeal from the final rejection of May 20, 2003 (Paper No. 11) of claims 1-10 and 12-19 in Application No. 09/738,979. In accordance with the provisions of 37 C.F.R. § 1.192, Appellant submits the following:

I. REAL PARTY IN INTEREST

The real party in interest in this appeal is Nitto Denko Corporation. Assignment of the application was submitted to the U.S. Patent and Trademark Office on December 20, 2000, and recorded on the same date at Reel 011384, Frame 0803.

II. RELATED APPEALS AND INTERFERENCES

There are no known appeals or interferences that will affect, be directly affected by, or have a bearing on the Board's decision in the pending appeal.

III. STATUS OF CLAIMS

Claims 1-19 are pending in the application with claim 1 being in independent form. As set forth in the Office Action dated May 20, 2003, claims 1, 2, 15 and 19 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Yuuki et al. (US Patent 6,147,725; hereafter "Yuuki") in view of Margerum et al. (US Patent 5,099,343; hereafter "Margerum"). Claims 1, 7-10, 13, 14 and 15 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Taira et al. (US Patent 5,712,694; hereafter "Taira") in view Margerum. Claim 12 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Taira in view of Margerum and Miyashita et al. (US Patent 6,011,602; hereafter "Miyashita"). Claims 3 and 4 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Yuuki in view of Margerum and Nakamura (US Patent 6,137,554). Claim 5 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Yuuki in view of Margerum, Nakamura and Taira. Claim 6 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Yuuki in view of Margerum, Nakamura, Taira and Koike (US Patent 6,322,225). Claims 16-18 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Yuuki in view of Margerum and Yokota et al. (USP 5,764,315; hereafter "Yokota"). Claim 11 is

objected to as being dependent upon a rejected base claim but would be allowable if rewritten in independent form. All of the rejected claims are set forth in the attached Appendix.

IV. STATUS OF AMENDMENTS

No claim amendments were requested subsequent to the Final Office Action of May 20, 2003.

V. SUMMARY OF THE INVENTION

The present invention is directed to a transmission type or transmission-reflection double type liquid crystal display device having reduced thickness and weight and providing excellent display quality. (page 1, lines 5-8).

As shown in Figure 1 illustrating one embodiment of the present invention, a liquid-crystal display device comprises a transmission type liquid-crystal display panel L, a light source 91 disposed on a side surface of the liquid-crystal display panel L, and an optical path changing sheet 11 disposed on a back side of the liquid-crystal display panel L. The liquid-crystal display panel L includes a liquid-crystal cell 70 enclosed between cell substrates 41 and 42 through a sealing material 71. Incident light from the arrangement side of the optical path changing sheet 11 is made to go out as display light from a visual side under control by the liquid crystal 70 which is driven by transparent electrodes 51 and 52 provided on inner sides of the cell substrates

41 and 42. The liquid-crystal display panel may include polarizers 21 and 22, retarders 31 and 32, and a light diffusing layer 13. (page 6, line 17 - page 9, line 10).

The light source 91 emits light which enters the side surface of the liquid-crystal display panel L. The optical path changing sheet 81 is disposed on the back side (opposite to the visual side) of the liquid-crystal display panel so that the optical path of incident light or transmission light from the light source 91 is changed towards the visual side of the liquid-crystal display panel L to be used as illumination light (display light). For this purpose, the optical path changing sheet 11 is provided with slopes A1 which reflect light which is incident from the light source 91 in a predetermined direction to thereby change the optical path of the light. A reduction in thickness and weight of the liquid-crystal display device can be achieved when the light source disposed on the side surface of the liquid-crystal display panel is used in combination with the optical path changing sheet disposed on the back of the liquid-crystal display panel. (page 13, line 4 - page 15, line 18).

VI. ISSUES

(A) Whether independent claim 1 was erroneously rejected under 35 U.S.C. § 103(a) as being unpatentable in view of Yuuki and Margerum?

(B) Whether independent claim 1 was erroneously rejected under 35 U.S.C. § 103(a) as being unpatentable in view of Taira and Margerum?

VII. GROUPING OF CLAIMS

Appellant submits that claims 1-10 and 12-19 stand and fall together. Reasons for patentability are set forth below.

VIII. ARGUMENTS

A. Claim 1 is Patentable Over Yuuki in view of Margerum.

Independent claim 1 is directed to a liquid-crystal display device. Claim 1 requires “a transmission type liquid-crystal display panel including a liquid-crystal cell; a light source disposed on at least one side surface of said liquid-crystal display panel; and an optical path changing sheet disposed on a back side, opposite to a visual side, of said liquid-crystal display panel and having optical path changing slopes by which incident light from said light source is reflected toward said visual side of said liquid-crystal display device.”

Appellant respectfully submits that claim 1 would not have been rendered obvious in view of Yuuki and Margerum because one of ordinary skill in the art would not have been motivated to modify the display device of Yuuki based on the teachings of Margerum to dispose a light source on a side of the liquid-crystal display panel.¹

¹ To establish a prima facie case of obviousness under 35 U.S.C. § 103, there must be some suggestion or motivation to modify or combine the reference teachings. “To support the conclusion that the claimed invention is directed to obvious subject matter, either references must expressly or impliedly suggest the claimed invention or the examiner must present a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the reference.” *Ex parte Clapp*, 227 USPQ 972, 973 (Bd. Pat. App. & Inter. 1985).

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Yuuki is directed to a liquid crystal display panel module equipped with a backlight unit disposed on a back surface of a liquid-crystal display panel unit. (column 2, lines 61-64). Yuuki teaches the backlight unit 20 includes a light guide plate 11 disposed on a back surface of a liquid-crystal display panel unit 20, a plurality of reflecting members 50a-50f arranged at a bottom part of the light guide plate 11, and a light source 13 disposed on a side surface of the light guide plate 11. Light emitted from the light source 13 enters the light guide plate 11 and is directed upward to the liquid-crystal display panel unit 20 by the reflecting members 50a-50f. (column 2, line 66 - column 3, line 55; Figs. 2 and 3). Accordingly, as the Examiner correctly notes, Yuuki does not teach or suggest "a light source disposed on at least one side surface of said liquid-crystal display panel", as required by claim 1.

Margerum (Figures 1 and 2) discloses an edge-illuminated liquid crystal display device including a liquid crystal display panel 12, diffusers 46 and 48 disposed on opposite edges (side surfaces) 38 and 40 of the liquid crystal display panel 12, polarizers 50 and 52 disposed on the diffusers 46 and 48, and optical lamps 34 and 36 disposed on the polarizers 50 and 52. Light emitted from the optical lamps 34 and 36 is transmitted through front and back transparent face plates 30 and 32 which are utilized as light guides, and directed toward the front of the liquid crystal display panel 12 by a light absorbing material 33 (Fig. 1) or mirror 68 (Fig. 2) disposed on the back transparent face plate 32. (column 3, line 14 - column 4, line 58).

The Examiner asserts "Margerum is evidence that ordinary workers in the art of liquid crystals would find the reason, suggestion, or motivation to add direct edge lighting to the LCD

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to improve contrast under b[r]ight ambient light conditions relative [to] conventional back illumination." The Examiner further asserts that "it would have been obvious ... to modify the LCD of Yuuki with the direct edge lighting of Margerum to improve contrast under b[r]ight ambient light conditions relative [to] conventional back illumination." (page 3, third and fourth paragraphs, Office Action dated May 20, 2003).

However, Appellant respectfully submits that one of ordinary skill in the art would not have been motivated to move the light source from the side surface of the light guide plate to the side surface of the liquid crystal display panel because the proposed modification would impermissibly change the principle of operation of Yuuki's device.² In particular, Yuuki is directed to a backlight unit which can inexpensively and efficiently illuminate a liquid crystal panel. (column 2, lines 61-64). As such, Yuuki primarily concerned with the structure of the backlight unit including the light guide plate, the reflecting members, and the light source provided on one side of the light guide plate. Therefore, the Examiner's proposed modification of the liquid crystal display module of Yuuki would not only change the principle of operation of Yuuki's invention but would also render moot the teachings and objectives of Yuuki's invention.

Further, Appellant respectfully submits that based on the teachings of Margerum, one of ordinary skill in the art would not have been motivated to modify the display device of Yuuki by

² As set forth MPEP 2143.01, if the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious. *In re Ratti*, 270 F.2d 810, 123 USPQ 349 (CCPA 1959).

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simply moving the position of the light source from the side surface of the light guide plate of the backlight unit to the side surface of the liquid crystal panel, as the Examiner alleges.³ Although Margerum teaches providing light sources on opposite sides of a liquid crystal display panel, the Margerum display device requires a unique polymer dispersed liquid crystal (PDLC) film for changing the traveling path of the light such that the light scattering is controlled by the electrical field and the alignment characteristics of the PDLC film itself, as shown in Figs. 4a and 4b and described in column 5, line 9-31. That is, Margerum teaches that the intensity of light passing from edge (side) to edge (side) through the panel and emitted from the faces of the panel is controlled by an electrical field applied to the PDLC film. (column 2, lines 25-31). In addition, the structure of the liquid crystal display panel (e.g., light absorbing material 33, mirror 68 and transparent face plates 30 and 32) of Margerum clearly differs from the structure of the liquid crystal display panel of Yuuki due to the differences in the position of the light sources.

Thus, Appellant respectfully submits that in view of the teachings of Margerum, one of ordinary skill in the art would recognize that moving the position of the light source from the side surface of the light guide plate of the backlight unit to the side surface of the liquid crystal panel, as the Examiner alleges, would require wholesale modification of Yuuki's liquid crystal

³ The motivation to make a specific structure is not abstract, but practical, and is always related to the properties or uses one skilled in the art would expect the structure to have, if made. The critical inquiry is whether there is something in the prior art as a whole to suggest the desirability, and thus the obviousness, of making the combination. *In re Newell*, 13 U.S.P.Q.2d 1248, 1250 (Fed. Cir. 1989).

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panel module including the liquid crystal display panel and the backlight thereby changing the principle of operation, and rendering moot the teachings and objectives of Yuuki's invention.

Lastly, in the "Response to Arguments" section of the Office Action dated May 20, 2003, the Examiner (item 3, page 19) alleges "that Margerum teaches direct edge lighting as a result effective design variable whereby optimization involves only routine skill in the art of liquid crystals." However, in characterizing the teachings of Margerum in this manner, the Examiner appears to misapplying the caselaw regarding obviousness of claimed ranges, and more particularly optimization of ranges for variables such chemical concentration, temperature and volume, as set forth in MPEP 2144.05(II)(B). Appellant respectfully submits that it is quite clear that the claimed position of the light source in a liquid crystal display device is not a "result-effective design variable" as the Examiner alleges but rather is a structural feature which affects the overall structural design and operation of the liquid crystal display device.

Accordingly, Appellant respectfully submits that Appellant respectfully submits that independent claim 1, as well as dependent claims 2-10 and 12-19, should be allowable because one of ordinary skill in the art would not have been motivated to modify the display device of Yuuki based on the teachings of Margerum to produce the claimed invention.

B. Claim 1 is Patentable Over Taira in view of Margerum.

Appellant respectfully submits that claim 1 would not have been rendered obvious in view of Taira and Margerum because one of ordinary skill in the art would not have been motivated to modify the display device of Taira based on the teachings of Margerum to dispose a light source on a side of the liquid-crystal display panel.

Similar to Yuuki discussed above, Taira is directed to a backlight unit for a liquid crystal display device. Taira teaches the backlight unit is disposed on the back side of a liquid-crystal display panel (not shown) and includes a light guide plate 103 having a saw-toothed light-reflecting boundary face 1306, a reflecting plate 114, a prism sheet 109, a half-wave film 111 and a light source 101 disposed on a side surface of the light guide plate 103. Light 112 emitted from the top of the light guide plate 103 is then made incident on a liquid-crystal panel by a saw-toothed light-reflecting boundary face 1306 of the light guide plate 103. (Figures 2, 14 and 15; col. 13, line 50 - col. 14, line 43). Accordingly, as the Examiner correctly notes, Taira does not teach or suggest "a light source disposed on at least one side surface of said liquid-crystal display panel", as required by claim 1.

As discussed above, Margerum (Figures 1 and 2) discloses an edge-illuminated liquid crystal display device including a liquid crystal display panel 12, diffusers 46 and 48 disposed on opposite edges (side surfaces) 38 and 40 of the liquid crystal display panel 12, polarizers 50 and 52 disposed on the diffusers 46 and 48, and optical lamps 34 and 36 disposed on the polarizers 50 and 52. Light emitted from the optical lamps 34 and 36 is transmitted through front and back

transparent face plates 30 and 32 which are utilized as light guides, and directed toward the front of the liquid crystal display panel 12 by a light absorbing material 33 (Fig. 1) or mirror 68 (Fig. 2) disposed on the back transparent face plate 32. (column 3, line 14 - column 4, line 58).

The Examiner asserts "Margerum is evidence that ordinary workers in the art of liquid crystals would find the reason, suggestion, or motivation to add direct edge lighting to the LCD to improve contrast under b[r]ight ambient light conditions relative [to] conventional back illumination." The Examiner further asserts that "it would have been obvious ... to modify the LCD of Taira with the direct edge lighting of Margerum to improve contrast under b[r]ight ambient light conditions relative [to] conventional back illumination." (page 6, third and fourth paragraphs, Office Action dated May 20, 2003).

However, Appellant respectfully submits that one of ordinary skill in the art would not have been motivated to move the light source from the side surface of the light guide plate to the side surface of the liquid crystal display panel because the proposed modification would impermissibly change the principle of operation of Taira's device.⁴ Similar to Yuuki, Taira is primarily directed to the structure of the backlight unit including the light guide plate, a prism sheet, a half-wave film, and the light source provided on a side of the light guide plate. Therefore, the Examiner's proposed modification of the liquid crystal display module of Taira

⁴ As set forth MPEP 2143.01, if the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious. *In re Ratti*, 270 F.2d 810, 123 USPQ 349 (CCPA 1959).

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would not only change the principle of operation of Taira's invention but would also render moot the teachings and objectives of Taira's invention.

Further, Appellant respectfully submits that based on the teachings of Margerum, one of ordinary skill in the art would not have been motivated to modify the display device of Taira by simply moving the position of the light source from the side surface of the light guide plate of the backlight unit to the side surface of the liquid crystal panel, as the Examiner alleges. Although Margerum teaches providing light sources on opposite sides of a liquid crystal display panel, the Margerum display device requires a unique polymer dispersed liquid crystal (PDLC) film for changing the traveling path of the light such that the light scattering is controlled by the electrical field and the alignment characteristics of the PDLC film itself, as shown in Figs. 4a and 4b and described in column 5, line 9-31. That is, Margerum teaches that the intensity of light passing from edge (side) to edge (side) through the panel and emitted from the faces of the panel is controlled by an electrical field applied to the PDLC film. (column 2, lines 25-31). In addition, the structure of the liquid crystal display panel (e.g., light absorbing material 33, mirror 68 and transparent face plates 30 and 32) of Margerum clearly differs from the structure of the liquid crystal display panel of Yuuki due to the differences in the position of the light sources.

Thus, Appellant respectfully submits that in view of the teachings of Margerum, one of ordinary skill in the art would recognize that moving the position of the light source from the side surface of the light guide plate of the backlight unit to the side surface of the liquid crystal panel, as the Examiner alleges, would require wholesale modification of Taira's liquid crystal

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panel module including the liquid crystal display panel and the backlight thereby changing the principle of operation, and rendering moot the teachings and objectives of Taira's invention.

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Accordingly, Appellant respectfully submits that Appellant respectfully submits that independent claim 1, as well as dependent claims 2-10 and 12-19, should be allowable because one of ordinary skill in the art would not have been motivated to modify the display device of Taira based on the teachings of Margerum to produce the claimed invention.

The present Brief on Appeal is being filed in triplicate. Unless a check is submitted herewith for the fee required under 37 C.F.R. §1.192(a) and 1.17(c), please charge said fee to Deposit Account No. 19-4880.

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Respectfully submitted,



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APPENDIX

CLAIMS 1-19 ON APPEAL:

1. (Previously Presented) A liquid-crystal display device comprising:

a transmission type liquid-crystal display panel including a liquid-crystal cell;

a light source disposed on at least one side surface of said liquid-crystal display panel;

and

an optical path changing sheet disposed on a back side, opposite to a visual side, of said liquid-crystal display panel and having optical path changing slopes by which incident light from said light source is reflected toward said visual side of said liquid-crystal display device.
2. (Original) A liquid-crystal display device according to claim 1, wherein said liquid-crystal display panel further includes a polarizer disposed on one or each side of said liquid-crystal cell.
3. (Original) A liquid-crystal display device according to claim 2, wherein said liquid-crystal display panel further includes at least one retarder disposed between said liquid-crystal cell and said polarizer.
4. (Original) A liquid-crystal display device according to claim 1, wherein said liquid-crystal display panel further includes cell substrates for supporting said liquid-crystal cell, said cell substrates being made of an optically isotropic material.

5. (Original) A liquid-crystal display device according to claim 4, wherein said optical path changing sheet has optical path changing slopes each inclined at an inclination angle in a range of from 35 to 48 degrees with respect to a sheet plane, said optical path changing sheet is bonded to said liquid-crystal display panel through an adhesive layer so that a slope-forming surface of said optical path changing sheet is located on said back side opposite to said visual side of said liquid-crystal display panel, and a refractive index difference is not larger than 0.15 between said optical path changing sheet and one of said cell substrates nearest to said optical path changing sheet.

6. (Previously Presented) A liquid-crystal display device according to claim 5, wherein the refractive index difference is not larger than 0.10 between said optical path changing sheet and said nearest liquid-crystal cell substrate, and a refractive index difference is not larger than 0.15 between said adhesive layer and said nearest liquid-crystal cell substrate.

7. (Original) A liquid-crystal display device according to claim 1, wherein said optical path changing sheet includes repetitive prismatic structures having optical path changing slopes facing said light source at an inclination angle of from 35 to 48 degrees with respect to said sheet plane.

8. (Original) A liquid-crystal display device according to claim 7, wherein said inclination angle of said optical path changing slopes of said optical path changing sheet facing said light source is in a range of from 38 to 45 degrees with respect to said sheet plane.

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9. (Original) A liquid-crystal display device according to claim 7, wherein each of said prismatic structures of said optical path changing sheet is constituted by a concave portion shaped like a triangle in section.

10. (Original) A liquid-crystal display device according to claim 9, wherein said prismatic concave portions are constituted by continuous grooves extended from one end of said sheet to the other end of said sheet in a ridgeline direction parallel to or inclined to a side surface of said liquid-crystal display panel on which said light source is disposed.

11. (Original) A liquid-crystal display device according to claim 7, wherein said prismatic concave portions are constituted by discontinuous grooves each of which has a length of not smaller than five times as large as the depth of said groove and in which a direction of a length of said groove is substantially parallel to a side surface of said liquid-crystal display panel on which said light source is disposed.

12. (Previously Presented) A liquid-crystal display device according to claim 7, wherein each of said prismatic structures of said optical path changing sheet is constituted by a concave or convex portion shaped like a trapezoid in section and having two or more optical path changing slopes facing said light source.

13. (Original) A liquid-crystal display device according to claim 1, further comprising a reflection layer disposed on a back side opposite to a visual side of said optical path changing sheet.

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14. (Original) A liquid-crystal display device according to claim 13, wherein said reflection layer adheres closely to a surface of said optical path changing sheet on which said optical path changing slopes are formed.

15. (Previously Presented) A liquid-crystal display device according to claim 1, further including no light-guiding plate.

16. (Previously Presented) A liquid-crystal display device according to claim 1, wherein said optical path changing sheet has a thickness that is less than $300\mu\text{m}$.

17. (Previously Presented) A liquid-crystal display device according to claim 1, wherein said optical path changing sheet has a thickness that is between about $5\mu\text{m}$ and about $200\mu\text{m}$.

18. (Previously Presented) A liquid-crystal display device according to claim 1, wherein said optical path changing sheet has a thickness that is between about $10\mu\text{m}$ and about $100\mu\text{m}$.

19. (Previously Presented) A liquid-crystal display device according to claim 1, wherein said light source is disposed in contact with said at least one side surface of said liquid-crystal display panel.



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V. SUMMARY OF THE INVENTION

The present invention is directed to a transmission type or transmission-reflection double type liquid crystal display device having reduced thickness and weight and providing excellent display quality. (page 1, lines 5-8).

As shown in Figure 1 illustrating one embodiment of the present invention, a liquid-crystal display device comprises a transmission type liquid-crystal display panel L, a light source 91 disposed on a side surface of the liquid-crystal display panel L, and an optical path changing sheet 11 disposed on a back side of the liquid-crystal display panel L. The liquid-crystal display panel L includes a liquid-crystal cell 70 enclosed between cell substrates 41 and 42 through a sealing material 71. Incident light from the arrangement side of the optical path changing sheet 11 is made to go out as display light from a visual side under control by the liquid crystal 70 which is driven by transparent electrodes 51 and 52 provided on inner sides of the cell substrates

41 and 42. The liquid-crystal display panel may include polarizers 21 and 22, retarders 31 and 32, and a light diffusing layer 13. (page 6, line 17 - page 9, line 10).

The light source 91 emits light which enters the side surface of the liquid-crystal display panel L. The optical path changing sheet 81 is disposed on the back side (opposite to the visual side) of the liquid-crystal display panel so that the optical path of incident light or transmission light from the light source 91 is changed towards the visual side of the liquid-crystal display panel L to be used as illumination light (display light). For this purpose, the optical path changing sheet 11 is provided with slopes A1 which reflect light which is incident from the light source 91 in a predetermined direction to thereby change the optical path of the light. A reduction in thickness and weight of the liquid-crystal display device can be achieved when the light source disposed on the side surface of the liquid-crystal display panel is used in combination with the optical path changing sheet disposed on the back of the liquid-crystal display panel. (page 13, line 4 - page 15, line 18).

VI. ISSUES

(A) Whether independent claim 1 was erroneously rejected under 35 U.S.C. § 103(a) as being unpatentable in view of Yuuki and Margerum?

(B) Whether independent claim 1 was erroneously rejected under 35 U.S.C. § 103(a) as being unpatentable in view of Taira and Margerum?

VII. GROUPING OF CLAIMS

Appellant submits that claims 1-10 and 12-19 stand and fall together. Reasons for patentability are set forth below.

VIII. ARGUMENTS

A. Claim 1 is Patentable Over Yuuki in view of Margerum.

Independent claim 1 is directed to a liquid-crystal display device. Claim 1 requires “a transmission type liquid-crystal display panel including a liquid-crystal cell; a light source disposed on at least one side surface of said liquid-crystal display panel; and an optical path changing sheet disposed on a back side, opposite to a visual side, of said liquid-crystal display panel and having optical path changing slopes by which incident light from said light source is reflected toward said visual side of said liquid-crystal display device.”

Appellant respectfully submits that claim 1 would not have been rendered obvious in view of Yuuki and Margerum because one of ordinary skill in the art would not have been motivated to modify the display device of Yuuki based on the teachings of Margerum to dispose a light source on a side of the liquid-crystal display panel.¹

¹ To establish a prima facie case of obviousness under 35 U.S.C. § 103, there must be some suggestion or motivation to modify or combine the reference teachings. “To support the conclusion that the claimed invention is directed to obvious subject matter, either references must expressly or impliedly suggest the claimed invention or the examiner must present a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the reference.” *Ex parte Clapp*, 227 USPQ 972, 973 (Bd. Pat. App. & Inter. 1985).

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Yuuki is directed to a liquid crystal display panel module equipped with a backlight unit disposed on a back surface of a liquid-crystal display panel unit. (column 2, lines 61-64). Yuuki teaches the backlight unit 20 includes a light guide plate 11 disposed on a back surface of a liquid-crystal display panel unit 20, a plurality of reflecting members 50a-50f arranged at a bottom part of the light guide plate 11, and a light source 13 disposed on a side surface of the light guide plate 11. Light emitted from the light source 13 enters the light guide plate 11 and is directed upward to the liquid-crystal display panel unit 20 by the reflecting members 50a-50f. (column 2, line 66 - column 3, line 55; Figs. 2 and 3). Accordingly, as the Examiner correctly notes, Yuuki does not teach or suggest "a light source disposed on at least one side surface of said liquid-crystal display panel", as required by claim 1.

Margerum (Figures 1 and 2) discloses an edge-illuminated liquid crystal display device including a liquid crystal display panel 12, diffusers 46 and 48 disposed on opposite edges (side surfaces) 38 and 40 of the liquid crystal display panel 12, polarizers 50 and 52 disposed on the diffusers 46 and 48, and optical lamps 34 and 36 disposed on the polarizers 50 and 52. Light emitted from the optical lamps 34 and 36 is transmitted through front and back transparent face plates 30 and 32 which are utilized as light guides, and directed toward the front of the liquid crystal display panel 12 by a light absorbing material 33 (Fig. 1) or mirror 68 (Fig. 2) disposed on the back transparent face plate 32. (column 3, line 14 - column 4, line 58).

The Examiner asserts "Margerum is evidence that ordinary workers in the art of liquid crystals would find the reason, suggestion, or motivation to add direct edge lighting to the LCD

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to improve contrast under b[r]ight ambient light conditions relative [to] conventional back illumination." The Examiner further asserts that "it would have been obvious ... to modify the LCD of Yuuki with the direct edge lighting of Margerum to improve contrast under b[r]ight ambient light conditions relative [to] conventional back illumination." (page 3, third and fourth paragraphs, Office Action dated May 20, 2003).

However, Appellant respectfully submits that one of ordinary skill in the art would not have been motivated to move the light source from the side surface of the light guide plate to the side surface of the liquid crystal display panel because the proposed modification would impermissibly change the principle of operation of Yuuki's device.² In particular, Yuuki is directed to a backlight unit which can inexpensively and efficiently illuminate a liquid crystal panel. (column 2, lines 61-64). As such, Yuuki primarily concerned with the structure of the backlight unit including the light guide plate, the reflecting members, and the light source provided on one side of the light guide plate. Therefore, the Examiner's proposed modification of the liquid crystal display module of Yuuki would not only change the principle of operation of Yuuki's invention but would also render moot the teachings and objectives of Yuuki's invention.

Further, Appellant respectfully submits that based on the teachings of Margerum, one of ordinary skill in the art would not have been motivated to modify the display device of Yuuki by

² As set forth MPEP 2143.01, if the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious. *In re Ratti*, 270 F.2d 810, 123 USPQ 349 (CCPA 1959).

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simply moving the position of the light source from the side surface of the light guide plate of the backlight unit to the side surface of the liquid crystal panel, as the Examiner alleges.³ Although Margerum teaches providing light sources on opposite sides of a liquid crystal display panel, the Margerum display device requires a unique polymer dispersed liquid crystal (PDLC) film for changing the traveling path of the light such that the light scattering is controlled by the electrical field and the alignment characteristics of the PDLC film itself, as shown in Figs. 4a and 4b and described in column 5, line 9-31. That is, Margerum teaches that the intensity of light passing from edge (side) to edge (side) through the panel and emitted from the faces of the panel is controlled by an electrical field applied to the PDLC film. (column 2, lines 25-31). In addition, the structure of the liquid crystal display panel (e.g., light absorbing material 33, mirror 68 and transparent face plates 30 and 32) of Margerum clearly differs from the structure of the liquid crystal display panel of Yuuki due to the differences in the position of the light sources.

Thus, Appellant respectfully submits that in view of the teachings of Margerum, one of ordinary skill in the art would recognize that moving the position of the light source from the side surface of the light guide plate of the backlight unit to the side surface of the liquid crystal panel, as the Examiner alleges, would require wholesale modification of Yuuki's liquid crystal

³ The motivation to make a specific structure is not abstract, but practical, and is always related to the properties or uses one skilled in the art would expect the structure to have, if made. The critical inquiry is whether there is something in the prior art as a whole to suggest the desirability, and thus the obviousness, of making the combination. *In re Newell*, 13 U.S.P.Q.2d 1248, 1250 (Fed. Cir. 1989).

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panel module including the liquid crystal display panel and the backlight thereby changing the principle of operation, and rendering moot the teachings and objectives of Yuuki's invention.

Lastly, in the "Response to Arguments" section of the Office Action dated May 20, 2003, the Examiner (item 3, page 19) alleges "that Margerum teaches direct edge lighting as a result effective design variable whereby optimization involves only routine skill in the art of liquid crystals." However, in characterizing the teachings of Margerum in this manner, the Examiner appears to misapplying the caselaw regarding obviousness of claimed ranges, and more particularly optimization of ranges for variables such chemical concentration, temperature and volume, as set forth in MPEP 2144.05(II)(B). Appellant respectfully submits that it is quite clear that the claimed position of the light source in a liquid crystal display device is not a "result-effective design variable" as the Examiner alleges but rather is a structural feature which affects the overall structural design and operation of the liquid crystal display device.

Accordingly, Appellant respectfully submits that Appellant respectfully submits that independent claim 1, as well as dependent claims 2-10 and 12-19, should be allowable because one of ordinary skill in the art would not have been motivated to modify the display device of Yuuki based on the teachings of Margerum to produce the claimed invention.

B. Claim 1 is Patentable Over Taira in view of Margerum.

Appellant respectfully submits that claim 1 would not have been rendered obvious in view of Taira and Margerum because one of ordinary skill in the art would not have been motivated to modify the display device of Taira based on the teachings of Margerum to dispose a light source on a side of the liquid-crystal display panel.

Similar to Yuuki discussed above, Taira is directed to a backlight unit for a liquid crystal display device. Taira teaches the backlight unit is disposed on the back side of a liquid-crystal display panel (not shown) and includes a light guide plate 103 having a saw-toothed light-reflecting boundary face 1306, a reflecting plate 114, a prism sheet 109, a half-wave film 111 and a light source 101 disposed on a side surface of the light guide plate 103. Light 112 emitted from the top of the light guide plate 103 is then made incident on a liquid-crystal panel by a saw-toothed light-reflecting boundary face 1306 of the light guide plate 103. (Figures 2, 14 and 15; col. 13, line 50 - col. 14, line 43). Accordingly, as the Examiner correctly notes, Taira does not teach or suggest "a light source disposed on at least one side surface of said liquid-crystal display panel", as required by claim 1.

As discussed above, Margerum (Figures 1 and 2) discloses an edge-illuminated liquid crystal display device including a liquid crystal display panel 12, diffusers 46 and 48 disposed on opposite edges (side surfaces) 38 and 40 of the liquid crystal display panel 12, polarizers 50 and 52 disposed on the diffusers 46 and 48, and optical lamps 34 and 36 disposed on the polarizers 50 and 52. Light emitted from the optical lamps 34 and 36 is transmitted through front and back

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transparent face plates 30 and 32 which are utilized as light guides, and directed toward the front of the liquid crystal display panel 12 by a light absorbing material 33 (Fig. 1) or mirror 68 (Fig. 2) disposed on the back transparent face plate 32. (column 3, line 14 - column 4, line 58).

The Examiner asserts "Margerum is evidence that ordinary workers in the art of liquid crystals would find the reason, suggestion, or motivation to add direct edge lighting to the LCD to improve contrast under b[r]ight ambient light conditions relative [to] conventional back illumination." The Examiner further asserts that "it would have been obvious ... to modify the LCD of Taira with the direct edge lighting of Margerum to improve contrast under b[r]ight ambient light conditions relative [to] conventional back illumination." (page 6, third and fourth paragraphs, Office Action dated May 20, 2003).

However, Appellant respectfully submits that one of ordinary skill in the art would not have been motivated to move the light source from the side surface of the light guide plate to the side surface of the liquid crystal display panel because the proposed modification would impermissibly change the principle of operation of Taira's device.⁴ Similar to Yuuki, Taira is primarily directed to the structure of the backlight unit including the light guide plate, a prism sheet, a half-wave film, and the light source provided on a side of the light guide plate. Therefore, the Examiner's proposed modification of the liquid crystal display module of Taira

⁴ As set forth MPEP 2143.01, if the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious. *In re Ratti*, 270 F.2d 810, 123 USPQ 349 (CCPA 1959).

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would not only change the principle of operation of Taira's invention but would also render moot the teachings and objectives of Taira's invention.

Further, Appellant respectfully submits that based on the teachings of Margerum, one of ordinary skill in the art would not have been motivated to modify the display device of Taira by simply moving the position of the light source from the side surface of the light guide plate of the backlight unit to the side surface of the liquid crystal panel, as the Examiner alleges. Although Margerum teaches providing light sources on opposite sides of a liquid crystal display panel, the Margerum display device requires a unique polymer dispersed liquid crystal (PDLC) film for changing the traveling path of the light such that the light scattering is controlled by the electrical field and the alignment characteristics of the PDLC film itself, as shown in Figs. 4a and 4b and described in column 5, line 9-31. That is, Margerum teaches that the intensity of light passing from edge (side) to edge (side) through the panel and emitted from the faces of the panel is controlled by an electrical field applied to the PDLC film. (column 2, lines 25-31). In addition, the structure of the liquid crystal display panel (e.g., light absorbing material 33, mirror 68 and transparent face plates 30 and 32) of Margerum clearly differs from the structure of the liquid crystal display panel of Yuuki due to the differences in the position of the light sources.

Thus, Appellant respectfully submits that in view of the teachings of Margerum, one of ordinary skill in the art would recognize that moving the position of the light source from the side surface of the light guide plate of the backlight unit to the side surface of the liquid crystal panel, as the Examiner alleges, would require wholesale modification of Taira's liquid crystal

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panel module including the liquid crystal display panel and the backlight thereby changing the principle of operation, and rendering moot the teachings and objectives of Taira's invention.

Lastly, in the "Response to Arguments" section of the Office Action dated May 20, 2003, the Examiner (item 3, page 19) alleges "that Margerum teaches direct edge lighting as a result effective design variable whereby optimization involves only routine skill in the art of liquid crystals." However, in characterizing the teachings of Margerum in this manner, the Examiner appears to misapplying the caselaw regarding obviousness of claimed ranges, and more particularly optimization of ranges for variables such chemical concentration, temperature and volume, as set forth in MPEP 2144.05(II)(B). Appellant respectfully submits that it is quite clear that the claimed position of the light source in a liquid crystal display device is not a "result-effective design variable" as the Examiner alleges but rather is a structural feature which affects the overall structural design and operation of the liquid crystal display device.

Accordingly, Appellant respectfully submits that Appellant respectfully submits that independent claim 1, as well as dependent claims 2-10 and 12-19, should be allowable because one of ordinary skill in the art would not have been motivated to modify the display device of Taira based on the teachings of Margerum to produce the claimed invention.

The present Brief on Appeal is being filed in triplicate. Unless a check is submitted herewith for the fee required under 37 C.F.R. §1.192(a) and 1.17(c), please charge said fee to Deposit Account No. 19-4880.

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The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



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APPENDIX

CLAIMS 1-19 ON APPEAL:

1. (Previously Presented) A liquid-crystal display device comprising:

a transmission type liquid-crystal display panel including a liquid-crystal cell;

a light source disposed on at least one side surface of said liquid-crystal display panel;

and

an optical path changing sheet disposed on a back side, opposite to a visual side, of said liquid-crystal display panel and having optical path changing slopes by which incident light from said light source is reflected toward said visual side of said liquid-crystal display device.
2. (Original) A liquid-crystal display device according to claim 1, wherein said liquid-crystal display panel further includes a polarizer disposed on one or each side of said liquid-crystal cell.
3. (Original) A liquid-crystal display device according to claim 2, wherein said liquid-crystal display panel further includes at least one retarder disposed between said liquid-crystal cell and said polarizer.
4. (Original) A liquid-crystal display device according to claim 1, wherein said liquid-crystal display panel further includes cell substrates for supporting said liquid-crystal cell, said cell substrates being made of an optically isotropic material.

5. (Original) A liquid-crystal display device according to claim 4, wherein said optical path changing sheet has optical path changing slopes each inclined at an inclination angle in a range of from 35 to 48 degrees with respect to a sheet plane, said optical path changing sheet is bonded to said liquid-crystal display panel through an adhesive layer so that a slope-forming surface of said optical path changing sheet is located on said back side opposite to said visual side of said liquid-crystal display panel, and a refractive index difference is not larger than 0.15 between said optical path changing sheet and one of said cell substrates nearest to said optical path changing sheet.

6. (Previously Presented) A liquid-crystal display device according to claim 5, wherein the refractive index difference is not larger than 0.10 between said optical path changing sheet and said nearest liquid-crystal cell substrate, and a refractive index difference is not larger than 0.15 between said adhesive layer and said nearest liquid-crystal cell substrate.

7. (Original) A liquid-crystal display device according to claim 1, wherein said optical path changing sheet includes repetitive prismatic structures having optical path changing slopes facing said light source at an inclination angle of from 35 to 48 degrees with respect to said sheet plane.

8. (Original) A liquid-crystal display device according to claim 7, wherein said inclination angle of said optical path changing slopes of said optical path changing sheet facing said light source is in a range of from 38 to 45 degrees with respect to said sheet plane.

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9. (Original) A liquid-crystal display device according to claim 7, wherein each of said prismatic structures of said optical path changing sheet is constituted by a concave portion shaped like a triangle in section.

10. (Original) A liquid-crystal display device according to claim 9, wherein said prismatic concave portions are constituted by continuous grooves extended from one end of said sheet to the other end of said sheet in a ridgeline direction parallel to or inclined to a side surface of said liquid-crystal display panel on which said light source is disposed.

11. (Original) A liquid-crystal display device according to claim 7, wherein said prismatic concave portions are constituted by discontinuous grooves each of which has a length of not smaller than five times as large as the depth of said groove and in which a direction of a length of said groove is substantially parallel to a side surface of said liquid-crystal display panel on which said light source is disposed.

12. (Previously Presented) A liquid-crystal display device according to claim 7, wherein each of said prismatic structures of said optical path changing sheet is constituted by a concave or convex portion shaped like a trapezoid in section and having two or more optical path changing slopes facing said light source.

13. (Original) A liquid-crystal display device according to claim 1, further comprising a reflection layer disposed on a back side opposite to a visual side of said optical path changing sheet.

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14. (Original) A liquid-crystal display device according to claim 13, wherein said reflection layer adheres closely to a surface of said optical path changing sheet on which said optical path changing slopes are formed.

15. (Previously Presented) A liquid-crystal display device according to claim 1, further including no light-guiding plate.

16. (Previously Presented) A liquid-crystal display device according to claim 1, wherein said optical path changing sheet has a thickness that is less than $300\mu\text{m}$.

17. (Previously Presented) A liquid-crystal display device according to claim 1, wherein said optical path changing sheet has a thickness that is between about $5\mu\text{m}$ and about $200\mu\text{m}$.

18. (Previously Presented) A liquid-crystal display device according to claim 1, wherein said optical path changing sheet has a thickness that is between about $10\mu\text{m}$ and about $100\mu\text{m}$.

19. (Previously Presented) A liquid-crystal display device according to claim 1, wherein said light source is disposed in contact with said at least one side surface of said liquid-crystal display panel.